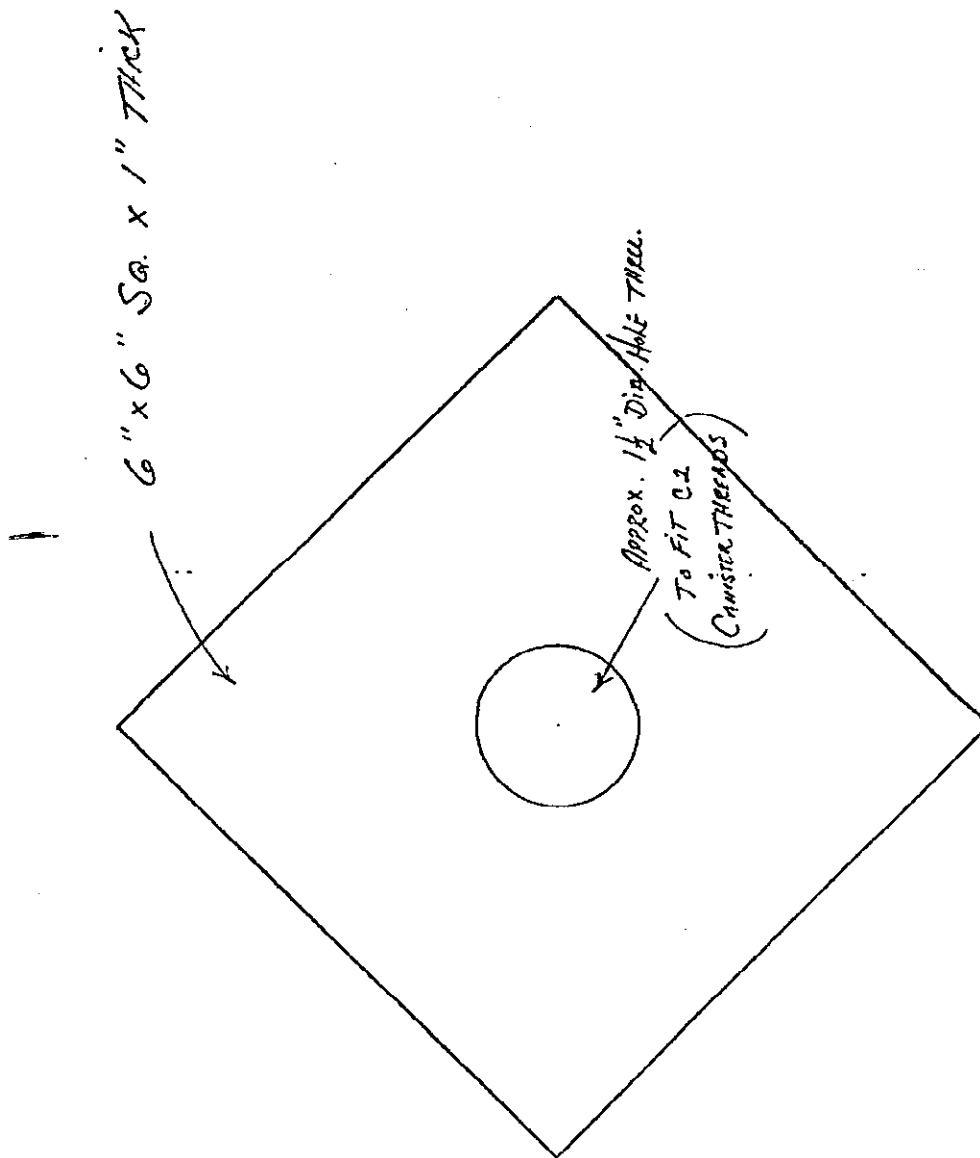
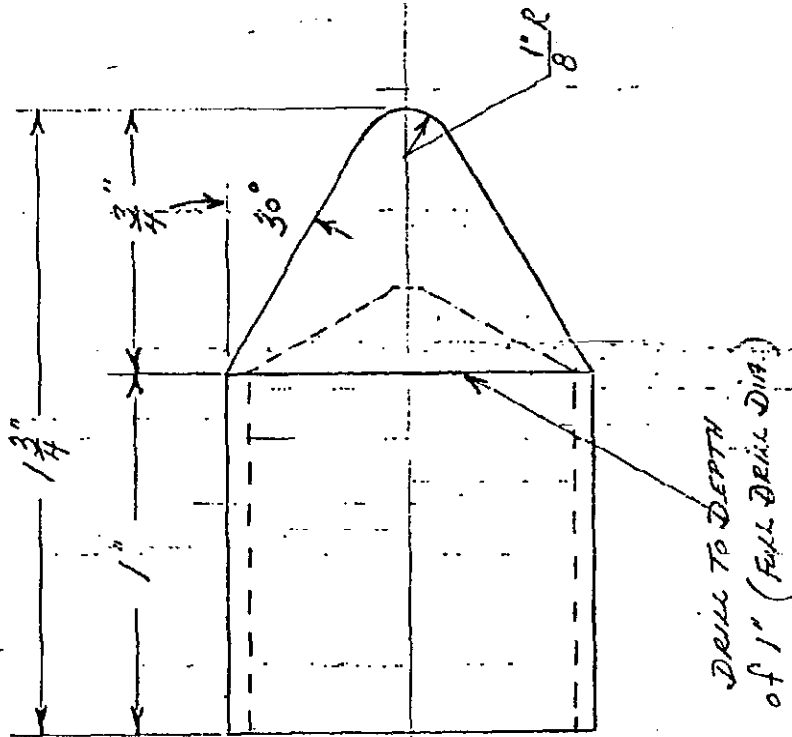
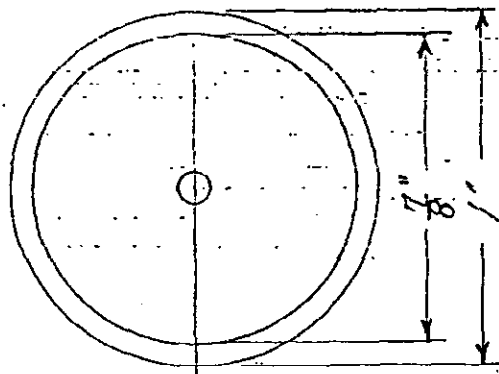


MATERIAL - HARD WOOD 1" THICK

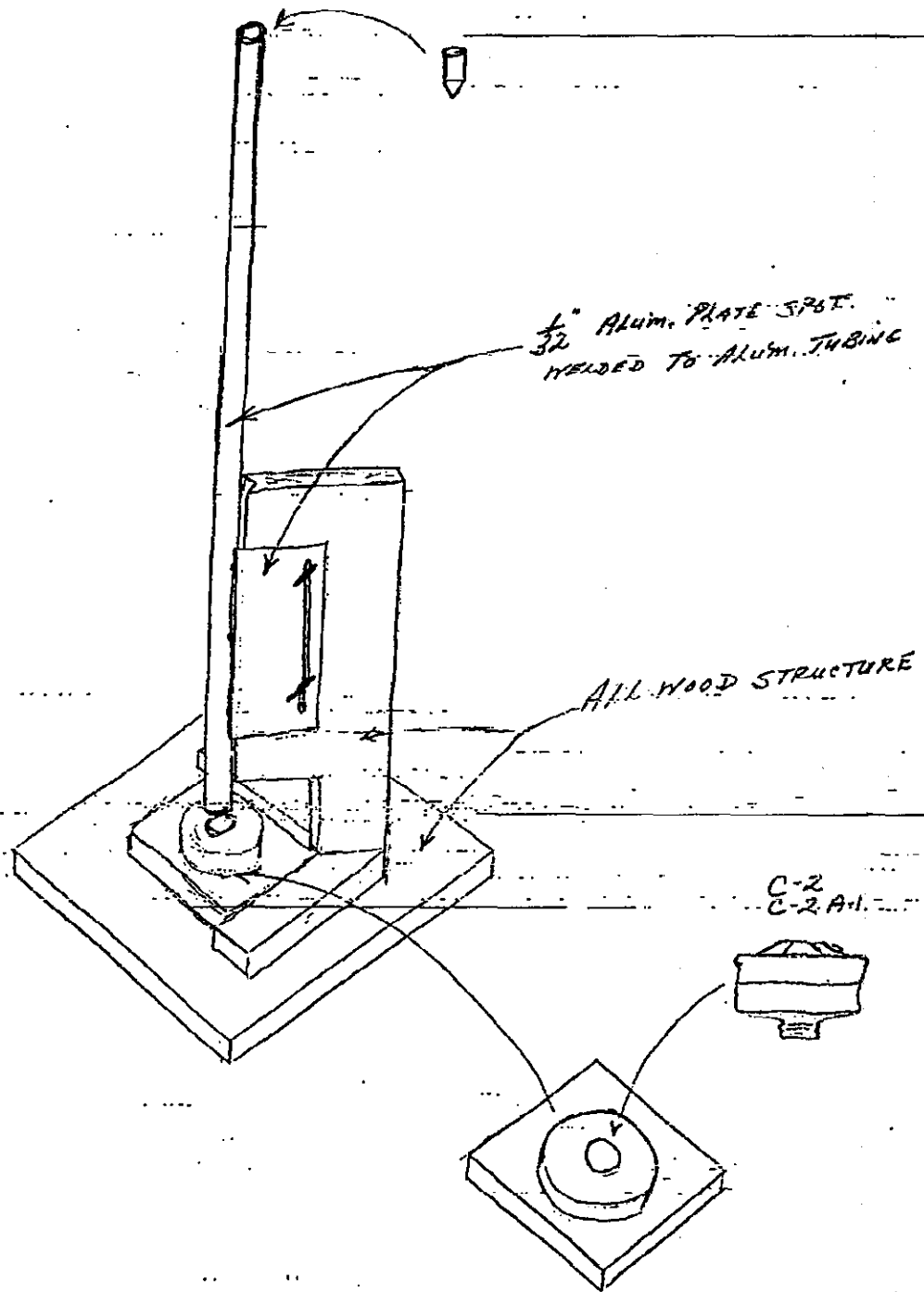


Sketch 1

MATERIAL - TOOL STEEL
 APPROX. WEIGHT - 10 LBS.



Sketch 2



PUNCTURE RESISTANCE TESTER

Attachment C.

NOR continuation sheet 2 of 12 for NOR Z66-0024-0002

SPECIAL PACKAGING INSTRUCTIONNATIONAL STOCK NUMBER
4240-01-361-1319NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1PAGE NUMBER
2 of 11
SPI NUMBER (PN)
P5-3-1520**1. LEVEL A.**

Eighteen canisters, unit packed as specified herein, shall be packed in three layers (2 by 3 pattern) in a fiberboard box conforming to style RSC, grade V3c, class weather-resistant, of ASTM D5118. The box shall have inside dimensions of 14 3/8 x 9 1/2 x 11 3/8 inches, length, width and depth, respectively. The canisters shall be separated by interlocking partitions, which shall extend the full height of the unit pack can. The partitions shall be fabricated of fiberboard conforming to type CF, class weather resistant, variety SW, grade W6c minimum, of ASTM D4727. Fiberboard pads fabricated of the same material as the interlocking partitions shall be placed on the top and bottom, and between layers, with additional pads as required to make a tight pack. The box shall be closed in accordance with ASTM D 1974. The corners of the closed box shall be blunted, and this assembly shall then be placed into a bag conforming to PPP-B-26, type II, style 1, .006 inches thick, size 22 x 28 inches, length by width. The bag shall be closed by heat sealing in accordance with the bag material or bag supplier's recommendation for dwell, temperature and pressure requirements. Air volume inside the bag shall be kept at a minimum.

The bagged assembly shall be further enclosed in a class 2, style 2, 2 1/2 or 4 nailed wood box, weight of contents 0 - 50 pounds, conforming to PPP-B-621; or an overseas type, cleated-plywood box, style optional, weight of contents 0 - 75 pounds, of PPP-B-601. The inside dimensions shall be 14 7/8 x 10 x 12 1/8 inches, length, width and depth, respectively. The interior of the box shall be lined with six fiberboard pads (top, bottom, sides and ends), prior to inserting the bagged assembly. Liner pads shall be fabricated of type CF, class weather resistant, variety SW, grade W6c minimum, of ASTM D4727. Additional pads shall be used as required to make a tight pack. The wood box shall be closed and strapped in accordance with the appendix of the applicable box specification.

2. LEVEL B

Eighteen canisters, unit packed as specified herein, shall be packed as specified above for level A packing, except that the fiberboard box (size 14 3/8 x 9 1/2 x 11 3/8 inches) shall serve as the Level B pack. The unit packed canisters shall be separated as specified above for level A packing. The box shall be closed in accordance with method V closure requirement and reinforced using nonmetallic or tape banding, in accordance with the requirements of ASTM D1974.

- (E) - **Palletization.** When specified in the contract or order, the level A and B packs shall be palletized in conformance with the requirements of MIL-HDBK-147.
- (F) - **Special markings.** In addition to the standard interior and exterior container markings required by MIL-STD-2073-1, each unit pack (can) and shipping container shall be marked to show the lot number of canister packaged therein. In addition, unit packs shall be marked as shown on the sketch on page 4. The shipping containers shall be marked with the canister date of manufacture. Special markings shall be in conformance with the applicable marking requirements in MIL-STD-2073-1.
- (G) - **Quality Assurance Provisions.** The first article and quality conformance inspection and testing requirements for level A unit packing shall be in accordance with this SPI; packing inspection shall be in accordance with the quality conformance inspection requirements of this SPI. Testing of the

NOR Continuation sheet 3 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTION

NATIONAL STOCK NUMBER
4240-01-361-1319

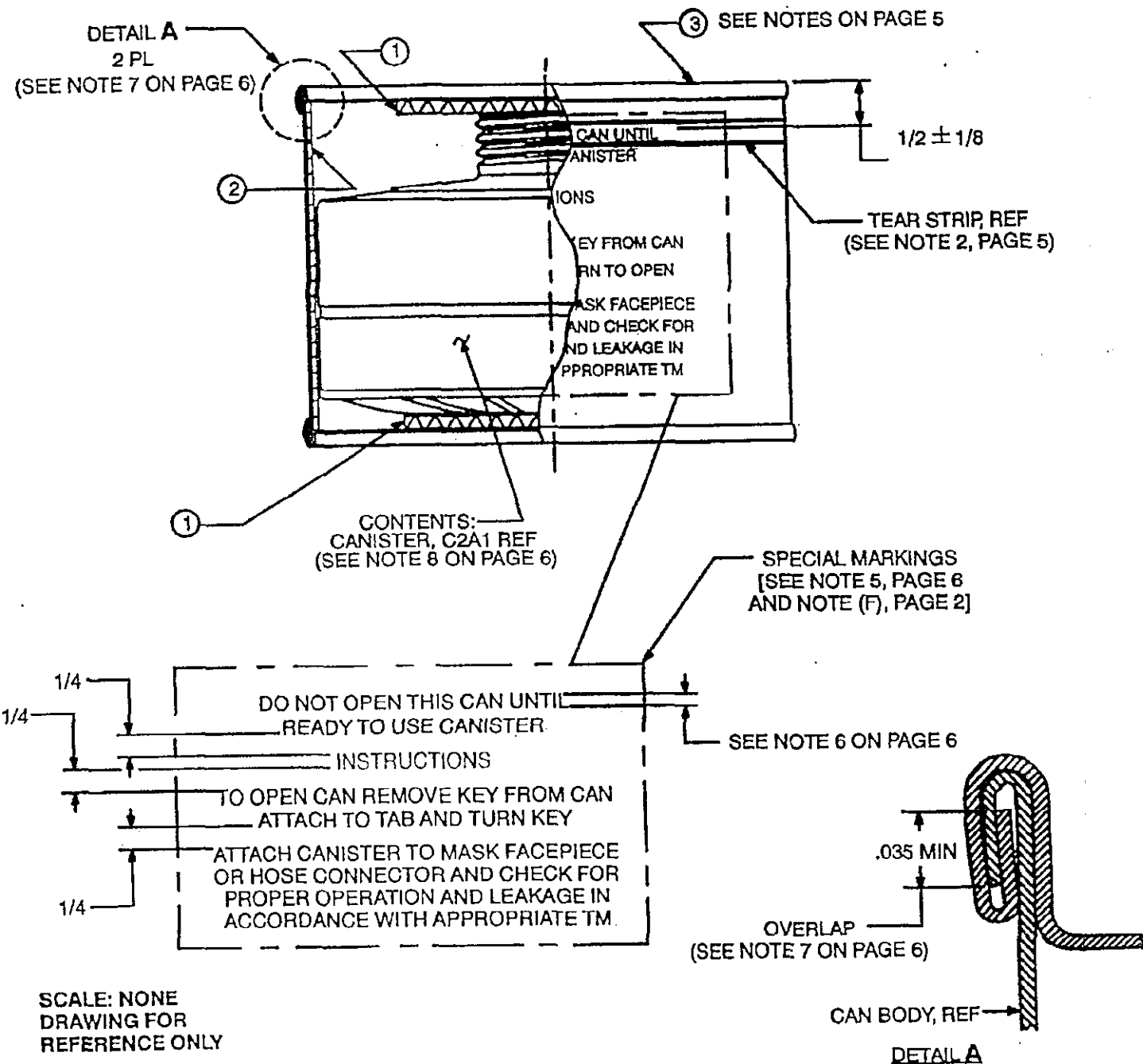
OMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1

PAGE NUMBER
3 of 11

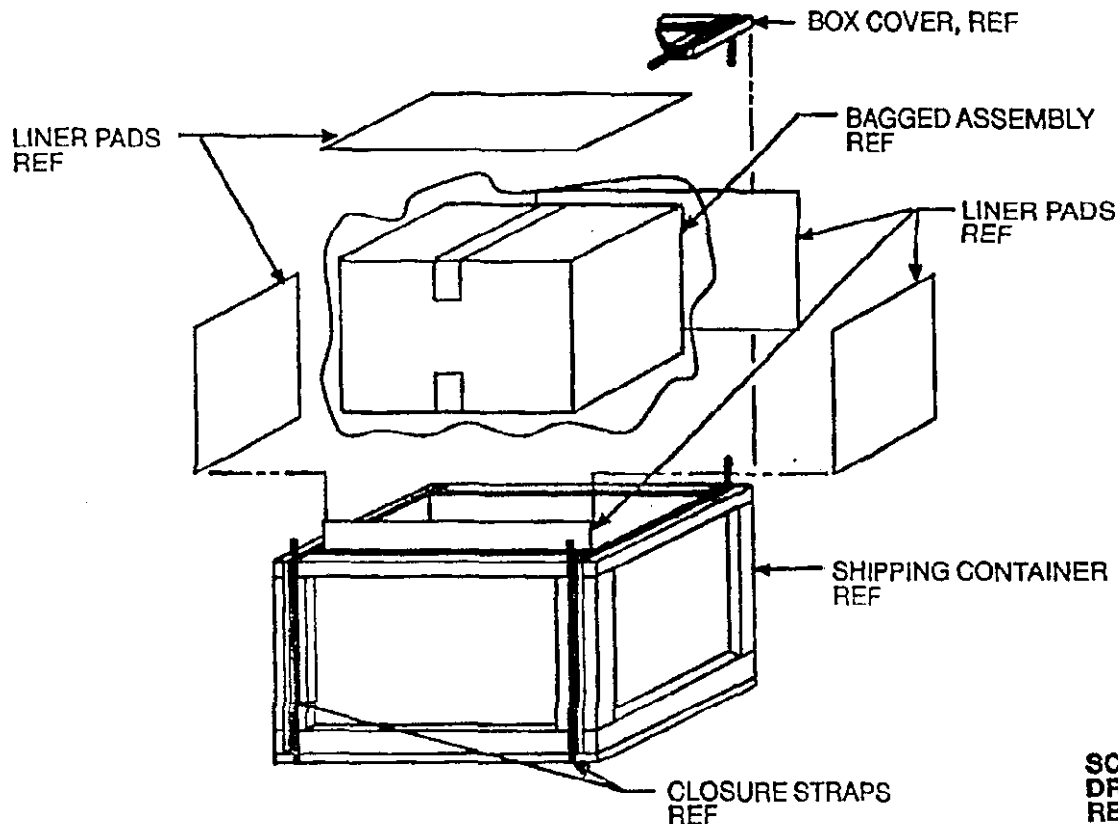
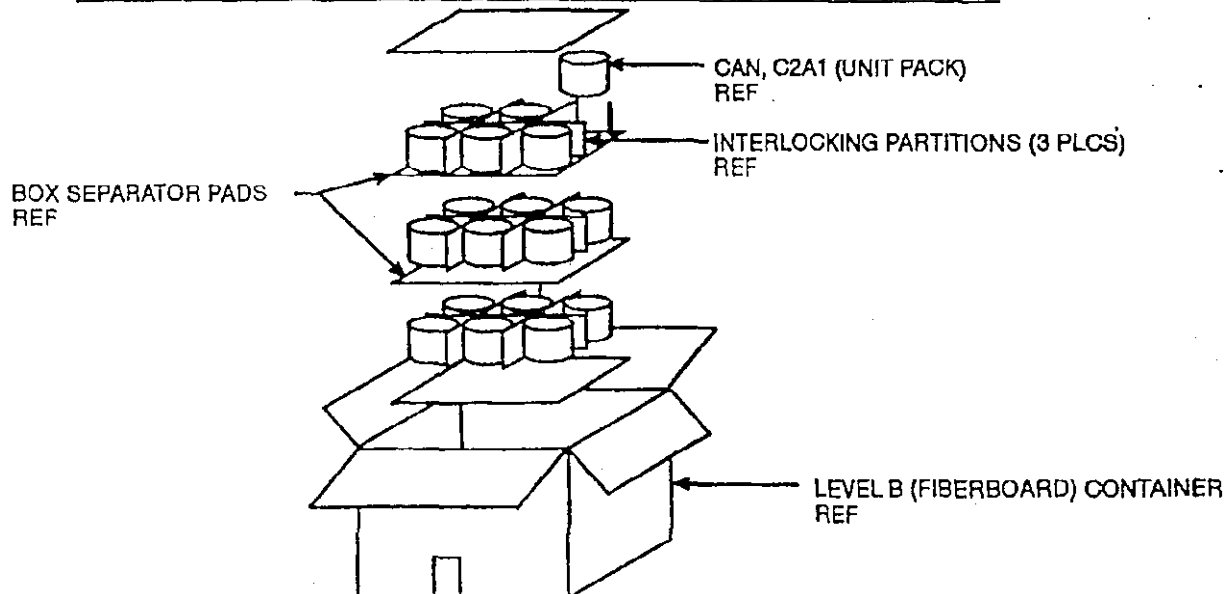
SPI NUMBER (PN)
P5-3-1520

bagged assembly is not required.

SKETCH NO. 1 - UNIT PACK ASSEMBLY



NOR Continuation sheet 4 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTIONNATIONAL STOCK NUMBER
4240-01-361-1319NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1PAGE NUMBER
4 of 11SPI NUMBER (PN)
P5-3-1520**SKETCH NO. 2 - LEVEL A PACKING CONFIGURATION**SCALE: NONE
DRAWINGS FOR
REFERENCE ONLY**SKETCH NO. 3 - LEVEL B PACKING CONFIGURATION**

NOR Continuation sheet 5 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTION

NATIONAL STOCK NUMBER

4240-01-361-1319

NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), G2A1

PAGE NUMBER

5 of 11

SPI NUMBER (PN)

P5-3-1520

TABLE I - PARTS LIST

1	CAN, METAL, 28 GAUGE OR LIGHTER, TYPE I, CLASS I, 107 LB BASE WT. ELECTROLYTIC TIN PLATE NO. 50 (TYPE, GRADE AND CLASS AT OPTION OF CAN MANUFACTURER), PLAN B PROTECTIVE COATING, SIZE $4.550 \pm .010$ DIA x $3.250 \pm .010$ DEEP (INSIDE DIMENSION), (MODIFIED -- SEE NOTE 1 BELOW)	PPP-C-96	3
1	PAPERBOARD, CUSHIONING, TYPE III, STYLE I, 13 1/2 x 2 5/8	PPP-P-291	2
2	FIBERBOARD, CORRUGATED, TYPE CF, CLASS DOMESTIC, GRADE 275, FLUTE B, 3 x 3	ASTM D4727	1
QTY REQD	NOMENCLATURE	MATERIAL	SPECIFICATION
			ITEM NO.

1. EXCEPTIONS TO AND ALTERNATE REQUIREMENTS OF SPECIFICATION PPP-C-96 SHALL BE AS FOLLOWS:

a. COAT ALL OF CAN EXTERIOR WITH PRIMER TT-P-664 PRIMER FOLLOWED BY ENAMEL TT-E-529. COLOR OF COATING SHALL MEET OR RANGE BETWEEN 24052, 24064, 24084, OR 24087 PER FED-STD-595. BAKING OF PRIMER AND ENAMEL IS PERMISSIBLE, HOWEVER, METAL TEMPERATURE SHALL NOT EXCEED 300° F. WHEN RECOMMENDED BY THE MARKING MATERIAL MANUFACTURER OR SUPPLIER, A PROTECTIVE FINISH CONFORMING TO MIL-V-21064 MAY BE APPLIED OVER CAN EXTERIOR AFTER MARKING (SEE NOTES 5 AND (F)).

b. EACH CAN BODY, WITH ATTACHED LID (CLOSURE LID SUPPLIED SEPARATELY) SUPPLIED BY THE CAN SUPPLIER, SHALL BE TESTED IN ACCORDANCE WITH ASTM E515, EXCEPT TEST DURATION SHALL BE FOR A MINIMUM OF 8 SECONDS AND GAUGE PRESSURE SHALL BE 8 PSI \pm 2 PSI. ANY LOSS OF GAUGE PRESSURE DURING THE DURATION (8 SECONDS MINIMUM) SHALL BE CAUSE FOR REJECTION, REJECTED CAN BODIES MAY BE RE-PROCESSED AND RETESTED.

c. AS AN ALTERNATE TO LAP WELDED SIDE SEAM CONSTRUCTION: A SKIP IS PERMITTED AT THE TEAR STRIP AND THE SEAM COMPLETED BY SOLDERING IN ACCORDANCE WITH SIDE SEAM REQUIREMENTS.

2. SCORED KEY OPENING (TEAR STRIP) SHALL BE LOCATED NEAR THE TOP OF CAN. THE EXACT LOCATION SHALL BE AT THE OPTION OF THE CAN SUPPLIER OR MANUFACTURER. THE CAN TEAR STRIP SHALL BE FORMED BY TWO OR MORE SCORES CUT INTO THE INSIDE SURFACE OF THE CAN. THE TONGUE OF THE TEAR STRIP SHALL BE TAPERED AND OF SUFFICIENT LENGTH TO ENGAGE THE KEY, AND CENTERED BETWEEN THE SCORE LINES. THE MINIMUM DEPTH OF THE SCORE SHALL BE SUCH THAT WHEN THE TEAR STRIP IS TESTED IN ACCORDANCE WITH THE UNIT PACK CAN TEAR STRIP OF THIS SPI, IT SHALL TEAR EVENLY AND STRAIGHT, AND SEPARATE COMPLETELY FROM THE CAN BODY LEAVING NO JAGGED EDGES. FOR WELDED SEAMS, THE TEAR STRIP SHALL BE MADE SO AS TO PERMIT CLEAN REMOVAL OF THE TEAR STRIP WHEN THE TEAR STRIP PASSES ACROSS WELDED SEAM. THE TEAR STRIP SHALL BE TESTED IN ACCORDANCE WITH TEAR STRIP TEST OF THIS SPI.

NDR Continuation Sheet 6 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTION		NATIONAL STOCK NUMBER 4240-01-361-1319	
NOMENCLATURE Canister, Chemical-Biological Mask, (ASZM-TEDA), C2A1		PAGE NUMBER 6 of 11	SPI NUMBER (PN) P5-3-1520

3. AFTER THE UNIT PACK HAS BEEN ASSEMBLED AS SPECIFIED IN NOTE (A) ON PAGE 1, RETREAT DAMAGED SURFACES USING THE SAME PROTECTIVE COATING USED ON ITEM 3.
4. UNIT PACK ASSEMBLY SHALL BE INSPECTED AND LEAK TESTED IN ACCORDANCE WITH THIS SPI.
5. STANDARD UNIT PACK IDENTIFICATION MARKINGS PER MIL-STD-2073-1 SHALL BE LOCATED 180° FROM OPENING INSTRUCTIONS. WHEN MARKING LABELS ARE USED, THEY SHALL NOT COVER THE TEAR STRIP STARTER TAB.
6. ALL CHARACTERS AND SPACES BETWEEN LINES OF CHARACTERS SHALL BE 1/8 INCH HIGH UNLESS OTHERWISE SPECIFIED.
7. THE CLOSURE END (LID) AND BOTTOM END (LID) SHALL BE ATTACHED TO THE CAN BODY BY MEANS OF A DOUBLE SEAM WITH A MINIMUM OVERLAP (HOOK) AS SHOWN ON VIEW A-A, PAGE 5. ATTACHMENT OF LID TO CAN BODY SHALL BE ACCOMPLISHED ON A SPIN HEAD CAN DOUBLE SEAM MACHINE (CAN STANDSTILL TYPE). THE CLOSURE AND BOTTOM LIDS SHALL BE TESTED FOR MINIMUM OVERLAP IN ACCORDANCE WITH CLOSURE AND BOTTOM SEAM TEST OF THIS SPI.
8. THE CANISTER SHALL BE INSERTED IN THE UNIT PACK CAN AS SHOWN WITH THE THREADED END UP.

NOR Continuation Sheet 7 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTIONNATIONAL STOCK NUMBER
4240-01-361-1319NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1PAGE NUMBER
7 of 11SPI NUMBER (PN)
P5-3-1520**QUALITY PERFORMANCE AND TESTING REQUIREMENTS****PART I - QUALITY PROVISIONS****1. First Article Inspection.**

a. **Submission.** The first article sample, specified in MIL-PRF-51560, shall be packaged (when military packaging is required) using the same methods, materials equipment and processes as will be used during regular production. The first article sample shall be submitted for inspection and approval in accordance with the terms on the contract.

b. **Inspection procedure.** The testing requirements for first article sampling are listed below in Table II in addition to their respective sampling quantities. Fifty-four randomly selected unit pack canister assemblies shall be examined in accordance with the characteristics cited in Part II.

c. **Packaging acceptance criteria.** If any first article sample item fails to comply with any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate inspection upon any failure to comply with any of the requirements. The contractor shall obtain written approval from the contracting activity prior to proceeding with regular production.

TABLE II. FIRST ARTICLE TESTS

REQUIREMENT	SAMPLE SIZE	TEST PARAGRAPH
TEAR STRIP ^(A)	10	Part III, 302
BOTTOM SEAM ^(A)	8 ^(B)	Part III, 303
LEAKAGE	600	Part III, 301
CLOSURE SEAM ^(A)	8 ^(B)	Part III, 304

(A) - Destructive test.

(B) - Eight unit packed canisters from each can seaming machine.

Same samples may be used for closure seam and bottom seam test.

2. Quality conformance Inspection.

a. **Lotting.** Lotting shall be as specified in MIL-PRF-51560.

b. **Sampling.**

(1) **For examination.** Sampling shall be conducted in accordance with Table III using the inspection levels specified in Part II. Samples shall be selected at random.

(2) **For test.** Sampling shall be conducted in accordance with Table IV. Samples shall be selected at random.

(NOR Continuation Sheet 8 of 12 for NOR 266-0024-0002)

SPECIAL PACKAGING INSTRUCTION

NATIONAL STOCK NUMBER
4240-01-361-1319

NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1

PAGE NUMBER
8 of 11

SPI NUMBER (PN)
P5-3-1520

TABLE III. Sampling

Lot size	Inspection levels and sample sizes										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
2 to 8	*	*	*	*	*	*	*	*	5	3	2
9 to 15	*	*	*	*	*	*	13	8	5	3	2
16 to 25	*	*	*	*	*	20	13	8	5	3	3
26 to 50	*	*	*	*	32	20	13	8	5	5	5
51 to 90	*	*	*	50	32	20	13	8	7	6	5
91 to 150	*	*	125	50	32	20	13	12	11	7	6
151 to 280	*	*	125	50	32	20	20	19	13	10	7
281 to 500	*	315	125	50	48	47	29	21	16	11	9
501 to 1200	*	315	125	75	73	47	34	27	19	15	11
1201 to 3200	1250	315	125	116	73	53	42	35	23	18	13
3201 to 10000	1250	315	192	116	86	68	50	38	29	22	15
10001 to 35000	1250	315	294	135	108	77	60	46	35	29	15
35001 to 150000	1250	490	294	170	123	96	74	56	40	29	15
150001 to 500000	1250	715	345	200	156	119	90	64	40	29	15
500001 and over	1250	715	435	244	189	143	102	64	40	29	15

*Indicates one hundred percent inspection. If sample size exceeds lot size, perform one hundred percent inspection.
Accept the lot represented on zero nonconforming characteristics and reject the lot represented on one or more nonconforming characteristics for all inspection levels.

c. Inspection procedure.

(1) **Inspection characteristics.** Critical characteristics are characteristics whose nonconformance to specified requirements is likely to result in hazardous or unsafe conditions for individuals using, maintaining or depending upon the product, whose nonconformance to specified requirements is likely to prevent performance of the tactical function of a major end item. Major characteristics are characteristics whose nonconformance to specified requirements is likely to result in failure or to reduce materially the usability of the item for its intended purpose. Minor characteristics are characteristics whose nonconformance to specified requirements is not likely to reduce materially the operation or usability of the item for its intended purpose.

NOR Continuation Sheet 9 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTIONNATIONAL STOCK NUMBER
4240-01-361-1319NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1PAGE NUMBER
9 of 11SPI NUMBER (PN)
P5-3-1520**TABLE IV. QUALITY CONFORMANCE TESTS**

REQUIREMENT	SAMPLE SIZE	TEST PARAGRAPH
TEAR STRIP ^(A)	22 empty cans ^(B)	Part III, 302
BOTTOM SEAM ^(A)	8 empty cans ^(B)	Part III, 303
LEAKAGE	100 percent; accept 0, reject 1	Part III, 301
CLOSURE SEAM ^(A)	8 accept 0, reject 1	Part III, 304

(A) Destructive test.

(B) Unit pack cans for bottom seam test may be selected from those used for tear strip test. Failure of any sample can to meet the tear strip or bottom seam overlap requirements of this SPI shall be cause for rejection of the lot of cans represented.

(C) Any unit pack canister assembly that fails the leakage test shall be rejected. An individual unit pack canister assembly leaker shall not be cause for rejection of the entire lot.

(2) **For examination.** Every item in the lot shall be inspected for critical characteristics. The lot represented shall be rejected when nonconformance to a critical characteristic is found. Sample packaged items shall be examined in accordance with the classification of characteristics in Part II. Failure of any sample item to conform to any characteristic in the classification of characteristics based on the sampling and acceptance criteria specified therein shall be cause for rejection of the lot represented.

(3) **For test.** Sample packaged items shall be tested in accordance with Table IV. Failure of any sample item to conform to any requirement in Table IV based on the sampling and acceptance criteria specified therein shall be cause for rejection of the lot represented, unless otherwise noted in Table IV and corresponding footnotes.

3. Inspection equipment coding.

- a. AD - Army designed special acceptance inspection equipment
- b. CD - Contractor designed special acceptance inspection equipment
- c. CE - Commercial inspection equipment
- d. VI - Visual Inspection

4. Inspection requirements for packaging. Any inspection requirements for packaging are applicable only when military packaging is required by the contract.

NOR Continuation sheet 10 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTION

NATIONAL STOCK NUMBER

4240-01-361-1319

NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1

PAGE NUMBER

10 of 11

SPI NUMBER (PN)

PS-3-1520

PART II - INSPECTION REQUIREMENTS**PACKING INSPECTION**

<u>Category</u>	<u>Characteristics</u>	<u>Sampling and acceptance criteria</u>	<u>Inspection method</u>
Critical	None defined		
Major			
101	Unit pack assembly correct	Table III, Level IV	VI and CE
102	Unit pack assembly supplied with tear strip	Table III, Level IV	VI
103	Corrosion resistant key furnished and attached to end of each can lid as specified	Table III, Level IV	VI
104	Repainting of exposed metal after assembly of unit pack (no unpainted metal or scratched, cracked or chipped paint)	Table III, Level IX	VI
105	Separator pads evident	Table III, Level IX	VI
*106	Liner pads evident	Table III, Level IX	VI
*107	Overwrap bag evident and undamaged (no rips, tears, punctures or abrasions)	Table III, Level IX	VI
108	Packing as specified	Table III, Level IX	VI and CE
109	Marking is correct	Table III, Level IX	VI and CE

*For Level A packing only.

PART III - TEST METHOD AND PROCEDURES

301 Unit pack assembly leakage. The unit packed canister shall be tested in a bath of hot water by submerging the unit pack can so that there is no entrapment of air and the uppermost surface is between 1 and 2 inches below the surface of the water. The unit packed canister shall be observed for leaks for not less than 30 seconds. The hot water bath shall have a maintained temperature of 185 ± 5 degrees Fahrenheit and have sufficient surfactant added to prevent surface bubbles from attaching to the unit pack can when submerged.

302 Tear strip. The key shall be attached to the tear strip tongue of the unit pack can and rotated in a clockwise direction around the circumference of the can. When the test is conducted using an empty can, structural integrity of the tear strip area shall be maintained during opening using a lid or other means.

NOR Continuation Sheet 11 of 12 for NOR 266-0024-0002

SPECIAL PACKAGING INSTRUCTION

NATIONAL STOCK NUMBER

4240-01-361-1319

NOMENCLATURE Canister, Chemical-Biological Mask,
(ASZM-TEDA), C2A1

PAGE NUMBER

11 of 11

SPI NUMBER (PN)

P5-3-1520

303 Bottom seam. Cut three specimens 120° apart from the bottom seam of the unit pack can and determine the minimum overlap dimension as defined in this SPI.

304 Closure seam. Cut three specimens 120° apart from the bottom seam of the unit pack can and determine the minimum overlap dimension as defined in this SPI.

PART IV – CERTIFICATION REQUIREMENTS

Certification shall be required for each characteristic specified below and shall include actual examination and test results when required herein. Results of examinations and tests shall be on file at the contractor's facility and shall be available to the Government for review.

Number**Characteristics****To Comply With**

401

All Packaging Material

Applicable Specification or Standard as specified herein.

NOR Continuation Sheet 12 of 12 for NOR 266-0024-0002

EA-DTL-1704A

22 January 1999

SUPERSEDING

EA-C-1704

24 January 1992

**CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PURCHASE DESCRIPTION**

**CARBON, ACTIVATED, IMPREGNATED, COPPER-SILVER-ZINC-MOLYBDENUM-
TRIETHYLENEDIAMINE (ASZM-TEDA)**

1. SCOPE

1.1 Scope. This specification covers activated carbon impregnated with copper, silver, zinc and molybdenum salts and triethylenediamine (TEDA) for use as a sorbent of toxic agents

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to insure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. None.

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

U.S. ARMY CHEMICAL RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

DRAWINGS

136-41-352 - Inspection Equipment Apparatus, Agent Testing, Ammonia
Content in Charcoal, Q3 Assembly

FSC 6810

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

Attachment 03

PUBLICATIONS

INSTRUCTION MANUALS

IM 136-300-34 – Instruction Manual for Installation, Operation, and Maintenance of Apparatus, Agent Testing, Ammonia Content in Charcoal, Q3

(Copies are available from Commander, U.S. Army Edgewood Research, Development and Engineering Center, ATTN: SCBRD-ENM-S, Aberdeen Proving Ground, MD 21010-5424.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issue of the documents cited in the solicitation (see 6.2).

ASTM STANDARDS

D 1193	– Reagent Water
D 2854	– Apparent Density of Activated Carbon
D 2862	– Particle Size Distribution of Granular Activated Carbon
D 2867	– Moisture in Activated Carbon
D 3802	– Ball-Pan Hardness of Activated Carbon

(Application for copies should be addressed to ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Materials. The active materials on the carbon shall be composed of and limited to copper, silver, zinc and molybdenum salts and TEDA. The base carbon shall be limited to steam activated carbon produced from bituminous coal.

3.2 Chemical and physical characteristics. The carbon shall conform to the chemical and physical characteristics specified in table I when tested as specified therein.

3.2.1 Particle size distribution. The carbon shall conform to the particle size distribution of table II when tested as specified in 4.3.6.1.

TABLE I. Chemical and physical characteristics

Characteristic	Requirement		Test paragraph
	Minimum	Maximum	
Moisture content, percent by weight	-----	2.5	4.3.6.2
Apparent (bulk) density, g/mL	-----	0.68	4.3.6.3
Hardness	85	-----	4.3.6.4
Ammonia, mg/L of air/100 mL carbon	-----	0.0010	4.3.6.5
Copper content, percent by weight	-----	6.0	4.3.6.6
Silver content, percent by weight	0.030	0.1	4.3.6.6
Zinc content, percent by weight	-----	6.0	4.3.6.6
Molybdenum content, percent by weight	-----	2.5	4.3.6.6
TEDA content, percent by weight	-----	3.5	4.3.6.7

TABLE II. Particle size distribution

Particle size	Percent by weight of original sample
Passing a 2.36 mm (No. 8) sieve	100
Retained on a 1.70 mm (No. 12) sieve	0 – 2
Retained on a 1.18 mm (No. 16) sieve	10 – 30
Retained on a 850 μ m (No. 20) sieve	40 – 65
Retained on a 600 μ m (No. 30) sieve	10 – 35
Passing a 600 μ m (No. 30) sieve	2.8 (maximum)*
Passing a 212 μ m (No. 70) sieve	0.30 (maximum)

*2.8 includes the material also passing through the No. 70 sieve

3.2.2 Gas sorption. The carbon shall conform to the gas sorption requirements of table III when tested as specified in 4.3.6.8.

TABLE III. Gas sorption requirements in minutes

Agent	Unaged Minimum	Unaged Min Avg	Aged* Minimum	Aged* Min Avg
Hydrogen cyanide (AC)	26	28	—	—
Cyanogen chloride (CK)	44	55	39	45
Phosgene (CG)	19	25	—	—
Dimethylmethylphosphonate (DMMP)	175	—	—	—

*Age carbon as specified in 4.3.6.8.1.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- (a) First article inspection (see 4.2)
- (b) Conformance inspection (see 4.3)

4.2 First article inspection.

4.2.1 Sample. A first article sample shall not be required unless it is specified in the acquisition document (see 6.2). When a first article inspection is required, the quantity sampled shall be manufactured using the same methods, materials, equipment, and processes as will be used during regular production. When a first article is required, sampling from the first article material for inspection and testing shall be the same as that which is required for a regular production lot in accordance with 4.3.2.

4.2.2 Inspections to be performed. As determined by the Government, sample first article items may be subjected to any or all of the examinations and tests specified in this specification and be inspected for compliance with any or all of the requirements of the applicable drawings and special packaging instructions.

4.2.3 Acceptance criteria. If any first article sample item fails to comply with any of the applicable requirements, the first article sample shall be rejected. The Government reserves the right to terminate inspection upon any failure to comply with any of the requirements. The contractor shall obtain written approval from the contracting activity prior to proceeding with regular production.

4.3 Conformance inspection.

4.3.1 Lotting. A lot shall consist of not more than 9 metric tons and not less than 250 kilograms (kg) of carbon, produced without change in materials by one manufacturer by one continuous process or in successive increments by the same intermittent process.

4.3.2 Sampling. Four (4) representative containers of carbon shall be randomly selected from each lot and a specimen of carbon shall be taken from each of those 4 containers and placed in separate clean dry containers in such a way as to minimize the exposure time of the carbon to the atmosphere. The size of each specimen shall be sufficient to provide all samples required for tests that are to be performed by the manufacturer in accordance with the terms of the contract (see 6.2) and to provide specimens for shipment to the designated government laboratory for required government testing. The containers shall then be sealed with an airtight closure and labeled to identify the manufacturer, lot and container represented. One sample shall be taken from each of the four specimens of carbon for testing as specified in 4.3.6.6 and 4.3.6.7. Two samples shall be taken from each specimen for testing in accordance with 4.3.6.1 through 4.3.6.5. The specimen containers shall be kept sealed except when samples are being removed for testing. A quantity of 4.5 to 5 kg from each of the 4 specimens shall be sealed in their individual containers and shipped to the designated government test laboratory for gas life testing in accordance with 4.3.6.8. One sample shall be taken from each of the 4 specimens for each of the five required chemical agent tests performed by the laboratory in accordance with 4.3.6.8. The five required chemical agent gas sorption tests include four tests on unaged carbon using AC, CK, CG, and DMMP and one test on aged carbon using CK.

4.3.3 Inspection procedure. The lot represented shall be rejected when nonconformance to a critical characteristic is found. Sample items shall be examined and tested in accordance in 4.3.6. Should any sample tested in accordance with 4.3.6 fail to comply with the requirements in tables I, II and III, the lot shall be rejected.

4.3.4 Inspection characteristics. Critical characteristics are characteristics whose nonconformance to specified requirements is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product or whose nonconformance to specified requirements is likely to prevent performance of the tactical function of a major end item. Major characteristics are characteristics whose nonconformance to specified requirements is likely to result in failure or to reduce materially the usability of the item for its intended purpose. Minor characteristics are characteristics whose nonconformance to specified requirements is not likely to reduce materially the operation or usability of the item for its intended purpose.

4.3.5 Classification of characteristics. Conformance tests are specified in 4.3.6. Acceptance criteria is to accept on no failures and reject on one or more failures for all characteristics. Particle size, moisture content, bulk density, hardness, ammonia content, metal content in 4.3.6.6, and TEDA content in 4.3.6.7 are considered major characteristics. Sorbent gas life in 4.3.6.8 is considered a critical characteristic.

4.3.6 Tests. Water in accordance with ASTM D 1193, type III and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.3.6.1 Particle size. Using the sieves specified in table II, determine the particle size distribution of two samples from each specimen container (see 4.3.2) in accordance with ASTM D 2862. Calculate the average weight percents of the particle size distribution for each container based on the average of two samples and compare average weight percents against requirements in table II.

4.3.6.2 Moisture content. Determine the moisture content of two samples drawn from each specimen container in accordance with the procedure in 4.3.6.2.1 or 4.3.6.2.2. Calculate the average moisture content for each container based on the average of two samples and compare such average against requirement in table I.

4.3.6.2.1 Drying by halogen radiator. Take two 10 ± 1 gram samples of carbon from each of the four specimen containers. Avoid taking samples from the top layer that is exposed to air. Place the sample in a Halogen Moisture Analyzer, Model No. HR73 or HG53, manufactured by Mettler Toledo or one that emits equivalent thermal radiation. Dry samples at 103° to 107°C for 50 seconds.

4.3.6.2.2 Oven drying. Take two samples of carbon from each of the four specimen containers. The weight of each carbon sample is specified in the oven drying method in ASTM D 2867. Avoid taking samples from the top layer that is exposed to air. Follow the oven drying procedures in ASTM D 2867 except use an oven temperature of 103° to 107°C and a drying time of 3 hours.

4.3.6.3 Apparent (bulk) density. Determine the apparent (bulk) density of two samples from each specimen container in accordance with ASTM D 2854. Calculate the average bulk density for each container based on the average of two samples and compare such average against requirement in table I.

4.3.6.4 Hardness. Determine the hardness (resistance to particle size degradation) of two samples from each specimen container in accordance with ASTM D 3802, except that a shaking period of $3 \text{ minutes} \pm 5 \text{ seconds}$ shall be used in lieu of the specified period of $10 \text{ minutes} \pm 10 \text{ seconds}$. Calculate the average hardness for each container based on the average of two samples and compare such average against requirement in table I.

4.3.6.5 Ammonia content. Determine the ammonia content of two samples from each specimen container using the Q3 Ammonia Content in Carbon Testing Apparatus (Drawing 136-41-352 and IM 136-300-34) or using an equivalent method approved by the Government. Calculate the average ammonia content for each container based on the average of two samples and compare such average against requirement in table I.

4.3.6.6 Total copper, silver, zinc and molybdenum content. Determine the total content of each metal on the carbon for each specimen container as follows:

4.3.6.6.1 Extraction. Extract the metals from the carbon sample by one of the following procedures:

(a) **By acid reflux.** Obtain a 5 to 10 g representative sample of carbon using blending and riffing techniques. Dry the sample in an oven at $105 \pm 2^\circ\text{C}$ for not less than 3 hours and cool in a desiccator to room temperature. Grind the sample until 95 percent or more will pass through a 325-mesh screen. Weigh 1.0000 ± 0.0001 g of carbon into a 250 milliliter (mL) flask. To the flask add 100 mL of reagent water and 65 mL of 20 percent nitric acid solution. Attach the flask to a reflux condenser and boil for 1 hour. Remove the flask from the heater and condenser. Filter the hot solution by vacuum through an 8 to 15 micrometer filter membrane. Rinse the flask with several portions of reagent water. Rinse the carbon on the filter with three 5 mL portions of 20 percent nitric acid solution. Quantitatively transfer the filtrate to a 500 mL volumetric flask and allow to cool to room temperature. Dilute to the mark with reagent water and mix thoroughly. The extract solution may require further dilution depending on the instrumentation used in the analysis (4.3.6.6.2).

(b) **By microwave treatment.** Obtain a representative sample of carbon using blending and riffing techniques. Dry the sample in an oven at $105 \pm 2^\circ\text{C}$ for not less than 3 hours and cool in a desiccator to room temperature. Weigh 0.2000 g of carbon to the nearest 0.0001 g and place in a lined microwave digestion vessel. Add 10 mL of 20 percent nitric acid and seal the vessel. Place the vessel in a holder in the microwave oven and attach vent tube to the collection container. Operate the microwave for 20 ± 1 minutes. At the conclusion of the digestion, open the digestion vessel and quantitatively transfer the solution into a 100 mL volumetric flask, dilute to the mark with reagent water and mix thoroughly. The extract solution may require further dilution depending on the instrumentation used in the analysis (4.3.6.6.2).

4.3.6.6.2 Analysis. Analyze the extract solution for the concentration of each of the 4 metals by atomic absorption spectrophotometry, inductively coupled plasma or by an equivalent method approved by the Government. Note that the acid content of the standards used in each metal determination must be the same as the acid content of the solution being analyzed. Following the analysis, calculate the weight percent of each of the 4 metal impregnants on the carbon.

4.3.6.6.3 Alternative methods. Alternative methods of determining metals content that deviate from 4.3.6.6.1 and 4.3.6.6.2 may be employed provided that those methods are approved by the Government prior to use. (See 6.6.)

4.3.6.7 TEDA content. Determine TEDA content of the carbon using the following method or equivalent method approved by the Government.

4.3.6.7.1 TEDA extraction. Weigh 1.000 ± 0.010 g of carbon directly into a 15 mL, flat-bottomed flask. Add 10 mL methanol from a measuring cylinder and fit the flask with a reflux condenser. Support the flask and condenser above a hot plate and reflux for 15 to 20 minutes. Remove from the source of heat and allow to cool to room temperature. Remove the reflux condenser and carefully transfer the extract by decanting into a 50 mL volumetric flask. Repeat

the extraction process three more times adding the methanol extracts to the volumetric flask. Finally rinse the carbon with 5 mL methanol adding the washing to the volumetric flask.

4.3.6.7.2 Preparation of solutions.

(a) **Preparation of tetramethylenediamine (TMEDA) internal standard solution.** Using a dropper pipette, weigh, to the nearest 0.001 g, 0.150 to 0.200 g (X) of TMEDA into a 50 mL volumetric flask. Make up to the mark with methanol and mix thoroughly.

(b) **Preparation of standard test solutions.** Prepare three standard solutions by weighing into three 50 mL volumetric flasks 0.015 ± 0.001 g, 0.030 ± 0.001 g and 0.045 ± 0.001 g TEDA, respectively. Add, by means of a volumetric pipette, 5 mL of TMEDA internal standard solution to each flask and make up to the mark with methanol. Mix thoroughly.

(c) **Preparation of sample test solution.** To the flasks containing the extracts and washing from the carbon samples (4.2.4.7.1(a)), add, by means of a volumetric pipette, 5 mL of TMEDA internal standard solution. Make up to the mark with methanol and mix thoroughly.

4.3.6.7.3 Gas chromatographic analysis. Analysis of the sample and standard test solutions shall be made using a gas chromatograph (see 6.3).

4.3.6.7.4 Calculations. Measure the areas of TEDA and TMEDA peaks for sample and standard test solutions, as they appear. Determine the ratio of areas, TEDA/TMEDA for each solution. Repeat sample injection twice more ensuring that the area ratios do not vary by more than 5 percent. Determine the average area ratio for each solution. Determine the concentration ratio of TEDA/TMEDA in each standard. (Note that TMEDA concentration in all solutions is X/10 grams per 50 mL). Plot concentration ratios versus area ratios for the three standard solutions using the origin as a fourth data point for calibration. Using linear regression, calculate the slope, M, of the calibration graph. From the area ratio measured for the sample solution, determine the concentration ratio, TEDA/TMEDA as follows:

$$\text{Concentration ratio} = \text{Area ratio} \times M$$

$$\text{Weight of TEDA determined} = \text{Concentration ratio} \times \frac{X}{10} \text{ grams}$$

$$\text{Percent TEDA on carbon} = \frac{\text{Weight of TEDA determined}}{\text{original weight of carbon}} \times 100$$

4.3.6.8 Standard gas sorption tests. Gas lives shall be determined using test apparatus approved by the Government and shall be tested under the conditions specified in table IV. The tests shall be performed in cylindrical containers using the conditions given in table V. Fill the test container with the test sample using a procedure such that the packing density is equivalent to that obtained using ASTM D 2854. In addition, the filling procedure used shall be such that

segregation of the carbon particles by size does not occur. For each chemical agent and aging condition listed in table III, determine the minimum gas life and average gas life for each group of 4 samples. In the event that one sample from one specimen produces a gas life that fails to meet the minimum gas life specification, two additional samples from that specimen shall be tested for the gas life in question, and the lower of the two additional test results shall be substituted for the original low value. The lot shall be accepted if the results of original samples meet the specification requirement, or, if after substitution of the lower of the two additional test results, the specification requirements are met.

4.3.6.8.1 Artificial aging. Prior to aging, the carbon shall be equilibrated for 16 hours at a relative humidity (RH) of 80 ± 3 percent, temperature of $24\pm3^{\circ}\text{C}$, and a flow rate approximately the test flow rate. After equilibrating, place the carbon in open containers and age for 7 days in air at 80 ± 3 percent RH and a temperature of $45\pm1^{\circ}\text{C}$. After aging, the carbon shall be re-equilibrated at 80 ± 3 percent RH at room temperature before testing with CK as specified in table IV.

TABLE IV. Standard Gas Sorption Test Conditions

Gas	Concentration* (mg/m ³)	Endpoint (mg/m ³)	Relative Humidity (percent)	Temperature (°C)
AC	4000±400	5**	80±3***	24±3°C
CK	4000±400	5	80±3***	24±3°C
CG	20000±1000	8	50±5****	24±3°C
DMMP	3000±400	0.04	<15****	24±3°C

* The variations to the nominal concentrations as indicated above will be allowed in conducting the test. However, the gas life results obtained for the test shall be corrected to the nominal values using the following equation:

$$\text{Corrected gas life} = (\text{Measured gas life}) \left(\frac{\text{Measured test concentration}}{\text{Nominal concentration}} \right)$$

**The endpoint time is the time when the effluent concentration of the earlier breakthrough of either AC or cyanogen reaches 5 mg/m³

***Carbon shall be equilibrated at 80±3 percent relative humidity, 24 ±3°C for 16 hours at approximately test flow rate.

****"As received" carbon will be used for these tests.

TABLE V. Test Parameters for Gas Sorption Measurements

Inside diameter of container, minimum, centimeters	4.0
Linear flow, centimeters per second	5.90 ± 0.05
Bed depth, centimeters	2.0 ± 0.1

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. *Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command.* Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The carbon covered by this specification is intended for use in military Nuclear-Biological-Chemical filters.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification
- (b) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced
- (c) Whether first article testing is required
- (d) Contractor and government responsibilities for inspection and testing (see 6.5)
- (e) Address(es) for shipment of samples for Government testing and time allowed for the Government to complete inspection/testing and report results
- (f) Packaging requirements

6.3 Gas chromatograph. The column description and parameters provided below have been found to achieve good gas chromatographic separations for the TEDA content test:

25 meter, 0.32 mm id BP 10 capillary column
Split-splitless injector, at 160°C, operated in splitless mode
Flame ionization detection; detector temperature 200°C
Inlet pressure 6 psi
Carrier gas - helium
GC oven: 65°C for 1 minute
65°C-170°C at 30°C/minute
170°C for 2 minutes
Injection volume: 1 microliter

6.4 Storage of containers with carbon. After containers are opened and the seal broken, the specimen containers should be stored in a controlled storage area with a relative humidity of 40 percent or less.

6.5 Responsibilities for inspection and testing. The contractor will normally be responsible for all inspections and tests except for the chemical agent gas life tests (4.3.6.8); however, the government has the right to conduct any or all of the inspections and tests at any time whether or not it has responsibility for them under the contract. Both the government and the contractor must perform all inspections and tests for which they are assigned responsibility under the contract regardless of what inspection and testing the other party may perform for their own purposes.

6.6 Submission of alternative inspection provisions. Alternate methods of inspection, testing and analysis including supporting rationale may be submitted by the contractor to the procuring contracting officer for evaluation and approval by the Government.

6.7 Subject term (key word) listing.

- (a) Carbon, activated
- (b) Carbon, ASZM-TEDA
- (c) Sorbent

Preparing activity:

Commander
U.S. Army Chemical Research, Development
and Engineering Center
ATTN: SCBRD-ENE-S
Aberdeen Proving Ground, MD 21010-5423